

**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 36**

**[Docket No. FAA-2000-7958; Notice No. 00-11]**

**RIN 2120-AH10**

**Noise Certification Regulations for Helicopters**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** The Federal Aviation Administration (FAA) is proposing changes to the noise certification regulations for helicopters. These proposed changes are based on a joint effort by the FAA, the European Joint Aviation Authorities (JAA), and Aviation Rulemaking Advisory Committee (ARAC), to harmonize the U.S. noise certification regulations and the European Joint Aviation Requirements (JAR) for helicopters. These proposed changes would provide nearly uniform noise certification standards for helicopters certificated in the United States, the JAA countries, and other countries that have adopted as their national regulation either the United States regulations, the JAA regulations, or the International Civil Aviation Organization (ICAO) standards. The harmonization of the noise certification standards would simplify airworthiness approvals for import and export purposes.

**DATE:** Comments must be received on or before [Insert date 90 days after date of publication in the Federal Register].

**ADDRESS:** Address your comments to the Docket Management System, U.S. Department of Transportation, Room Plaza 401, 400 Seventh Street, SW., Washington, DC 20590-0001. You must identify the docket number FAA-2000-7958 at the beginning of your comments, and you should submit two copies of your comments. If you wish to receive confirmation that FAA received your comments, include a self-addressed, stamped postcard.

You may also submit comments through the Internet to <http://dms.dot.gov>. You may review the public docket containing comments to these proposed regulations in person in the Dockets Office between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. The Dockets Office is on the plaza level of the NASSIF Building at the Department of Transportation at the above address. Also, you may review public dockets on the Internet at <http://dms.dot.gov>.

**FOR FURTHER INFORMATION CONTACT:** Sandy Liu, AEE-100, Office of Environment and Energy (AEE), Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591; telephone (202) 493-4864; facsimile (202) 267-5594; or email at [sandy.liu@faa.gov](mailto:sandy.liu@faa.gov).

#### **SUPPLEMENTARY INFORMATION:**

##### **Comments Invited**

Interested persons are invited to participate in this rulemaking by submitting written comments, data, views, or arguments. Comments on the possible environmental, economic, federalism, or energy-related impact of the adoption of this proposal are welcomed. Comments concerning the proposed implementation and effective date of the rule are also specifically requested.

Comments should carry the regulatory docket or notice number and should be submitted in triplicate to the Rules Docket address specified above. All comments received and a report summarizing any substantive public contact with FAA personnel on this rulemaking will be filed in the docket. The docket is available for public inspection both before and after the closing date for receiving comments.

Before taking any final action on this proposal, the Administrator will consider the comments made on or before the closing date for comments, and the proposal may be changed in light of the comments received.

The FAA will acknowledge receipt of comments if commenters include a self-addressed, stamped postcard with the comments. The postcards should be marked "Comments to Docket No. FAA-2000-7958." When the comments are received by the FAA, the postcards will be dated, time stamped, and returned to the commenters.

### **Availability of Rulemaking Documents**

You can get an electronic copy using the Internet by taking the following steps:

- (1) Go to the search function of the Department of Transportation's electronic Docket Management System (DMS) web page (<http://dms.dot.gov/search>).
- (2) On the search page type in the last four digits of the Docket number shown at the beginning of this notice. Click on "search."
- (3) On the next page, which contains the Docket summary information for the Docket you selected, click on the document number of the item you wish to view.

You can also get an electronic copy using the Internet through FAA's web page at <http://www.faa.gov/avr/arm/nprm/nprm.htm> or the Federal Register's web page at [http://www.access.gpo.gov/su\\_docs/aces/aces140.html](http://www.access.gpo.gov/su_docs/aces/aces140.html).

You can also get a copy by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267-9680. Make sure to identify the docket number, notice number, or amendment number of this rulemaking.

## **Background**

### Statement of the Problem

Various governmental bodies have developed noise certification regulations to control noise emissions from helicopters. The International Civil Aviation Organization (ICAO) issues on-going prototypical sets of aircraft noise standards which member States, including the United States, are encouraged to adopt into their respective national regulations. Many ICAO member States have adopted the ICAO standards verbatim. The United States has adopted into 14 CFR part 36 noise certification regulations that, although similar to the ICAO standard, differ substantively with the ICAO version. A third body, the Joint Aviation Authorities (JAA), is developing its own version of the ICAO standards with JAA member States in Europe. Thus, from a practical standpoint, three sets of helicopter noise certification requirements exist, each controlled by an independent political entity.

Helicopter manufacturers must demonstrate compliance with at least one, and often all three, of the sets of noise certification regulations when a helicopter is exported beyond its country of manufacture and certification. It has become apparent to the manufacturers that the differences

among the three versions of the helicopter noise standards are an undesirable burden. The manufacturers have requested that the regulating agencies harmonize the three sets of regulations in order to minimize the costs for demonstrating compliance.

These same aviation certification authorities, United States, JAA and ICAO, have previously recognized the value of harmonizing civil aircraft certification and operating regulations. The Administrator of the FAA supports harmonization and has committed the FAA to support the harmonization of the FAA regulations with those of the JAA and ICAO.

#### Current United States Helicopter Noise Certification Regulations

Under 49 U.S.C. 44715, the Administrator of the Federal Aviation Administration is directed to prescribe “standards to measure aircraft noise and sonic boom...and regulations to control and abate aircraft noise and sonic boom.” Part 36 of title 14 of the Code of Federal Regulations (14 CFR) contains the FAA’s noise standards and regulations that apply to the issuance of type certificates, changes in type design, and airworthiness certificates for specified classes and categories of aircraft. Subpart H and appendices H and J of part 36 contain the requirements and standards that apply to helicopters. Appendices H and J of part 36 specify the test conditions, procedures, and noise levels required to demonstrate compliance with certification requirements for helicopters. The original helicopter noise certification standards and regulations, including appendix H, were issued on February 5, 1988 (53 FR 3534). On September 16, 1992 (57 FR 42846), the FAA published an alternative noise certification procedure, appendix J, for helicopters that do not exceed 6,000 pounds maximum takeoff weight.

### ICAO Helicopter Noise Certification Standards

The International Civil Aviation Organization (ICAO) has also adopted a set of Standards and Recommended Practices for aircraft noise certification. These ICAO standards are similar to the United States regulations. The ICAO Annex 16 standards, which have no legal standing of their own, are intended to be prototypical regulations upon which the Contracting States to ICAO may base their own national regulations. For helicopters, Chapter 8 of Annex 16 is the approximate equivalent of part 36, appendix H; Chapter 11 of Annex 16 is the approximate ICAO equivalent to part 36, appendix J. The ICAO standards are issued as International Standards and Recommended Practices, Environmental Protection, Annex 16 to the Convention on International Civil Aviation, Volume 1, Aircraft Noise.

### Joint Aviation Authorities Helicopter Noise Certification Standards

The civil aviation authorities of certain European countries have agreed to common comprehensive and detailed airworthiness and operating requirements; these are known as the Joint Aviation Requirements (JARs). The JARs are intended to minimize type certification differences on multi-national European ventures and to facilitate the export and import of aviation products between European nations. Aviation authorities of participating countries recognize the JARs as an acceptable basis for showing compliance with their national aviation codes. The JAA added aircraft noise certification (JAR 36), including the helicopter requirements of Subsection D to the JARs effective May 23, 1997. The JAA's JAR 36 study group is tasked with the technical responsibilities for overseeing the noise certification standards. Another group, Abatement of Nuisances Caused by Air Transport (ANCAT), created under the auspices of the European Civil

Aviation Conference (ECAC), oversees the policy interests for the JAA. The ANCAT previously decided that the JAR aircraft noise certification standards does mirror the standards adopted by ICAO.

#### Aviation Rulemaking Advisory Committee (ARAC)

In January 1991, the FAA established the Aviation Rulemaking Advisory Committee (ARAC) to serve as a forum for the FAA to obtain input from outside the government on major regulatory issues. The FAA has tasked ARAC with several noise certification issues. These issues involve the harmonization of part 36 with JAR 36, the harmonization of associated guidance material including equivalent procedures, and interpretations of the regulations. On May 3, 1994, the ARAC established the FAR/JAR Harmonization Working Group for Helicopters (59 FR 22883). The Helicopter Harmonization Working Group (HHWG) is comprised of helicopter noise certification experts, and is responsible for addressing tasks assigned by ARAC. The United States and European interests are represented in the HHWG, which includes representatives of the helicopter manufacturers and aviation authority representatives from the FAA and the JAA/ANCAT. The HHWG is co-chaired by industry representatives from the United States and Europe, and meetings are held alternately in the United States and Europe.

The HHWG reviewed the helicopter noise certification provisions of 14 CFR part 36, subparts A and H, and appendices H and J, and the corresponding applicable provisions of JAR 36 and ICAO Annex 16. Differences between the regulations were identified and discussed. The goal of the HHWG is to harmonize the regulations by modifying or deleting conflicting requirements. The HHWG is not authorized to make recommendations for the creation of new requirements or

the removal of existing requirements that are common among the different sets of regulations. Methods for resolving the differences were agreed to and forwarded to each regulatory body for approval. A recommendation for amending part 36 was forwarded to the ARAC. After due consideration including a meeting open to the public on August 23, 2000, ARAC agreed to this recommendation and forwarded, in the form of a draft NPRM, to the FAA for consideration.

The overall structure for harmonizing the Federal Aviation Regulations and the Joint Aviation Regulations is described in the JAA/FAA Harmonization Work Program.

Under the Harmonization Work Program, the FAA and JAA agreed to form a Harmonization Working Group to harmonize the aircraft noise certification requirements of 14 CFR part 36 and JAR 36. The Working Group serves under the auspices of both ARAC and the JAA's JAR 36 Study Group. The JAA has adopted the ICAO noise certification standards; any recommended changes to the JARs resulting from a harmonization process, must first be acted on and approved by ICAO before they are considered by the JAA.

### **Synopsis of the Proposal**

Part 36 of the Federal Aviation Regulations (14 CFR) contains noise standards for aircraft type and airworthiness certification. Subpart H of part 36 and its related appendices H, and J prescribe noise levels and test procedures used for certification of civil helicopters in the normal, transport, restricted, or primary category, including rules governing the issuance of original, amended, or supplemental type certificates for helicopters for which application is made on or after March 6, 1986.

The FAA is proposing to amend some of the technical specifications included in appendices H and J, and proposes a new definition under § 36.1. No changes to the applicability of



part 36 are proposed. The proposed changes would not substantively alter the prescribed noise limits nor change the relative stringency of the regulations, i.e., the relationship between the noise level limits and the measured noise level of a given helicopter. These proposed changes may be categorized as (a) replacing an existing specification with a similar ICAO specification; (b) adding an existing ICAO specification to part 36 where a corresponding part 36 specification does not presently exist; or (c) removing an existing part 36 specification where there is no corresponding ICAO specification.

The FAA has examined the helicopter noise certification process and analyzed how the proposed changes would have affected previous helicopter noise certification projects. The cumulative effect of the proposed changes on a single certification would not typically exceed  $\pm 0.1$  decibels and would not be expected to exceed  $\pm 0.3$  decibels under a worst-case combination of conditions. The FAA has determined that the proposed changes would not substantively alter the noise certification levels or the finding of compliance of helicopters currently certificated under either appendix H or appendix J. Accordingly, the FAA has determined that these proposed changes are consistent with the statutory criteria for amending aircraft noise abatement regulations.

### **Section-by-Section Discussion**

The following is a section-by-section discussion of the proposed amendment.

#### **Section 36.1 Applicability and definitions.**

The FAA is proposing the addition of a new definition to § 36.1(h)(5) for “maximum normal operating RPM.” This would be defined as “the highest rotor speed for each reference procedure corresponding to the airworthiness limit imposed by the manufacturer and approved by the FAA.” This term would cover instances where a tolerance on the highest rotor speed is

specified and where the rotor speed is automatically linked with flight condition or can be changed by pilot action. As shown to apply to reference section H36.107(b)(5) and J36.105(c)(2).

#### Section 36.11 Acoustical change: Helicopters.

The proposed change would increase the maximum takeoff weight limit for appendix J applicability from 6,000 pounds to 7,000 pounds. The proposed change reflects a new requirement in the 14 CFR part 27 airworthiness standards for normal category rotorcraft. The part 27 revision, adopted in Amendment 27-37 and effective on October 18, 1999, increases the passenger seat limitation to nine, update of safety standards and consequential weight growth.

#### Subpart H - Helicopters

The proposed change to Subpart H regarding compliance with appendix J, is being made to conform to the weight change described above in the discussion of § 36.11. The same reasons for adoption apply to this change.

#### Subpart O – Operating Limitations and Information

Subpart O of part 36 specifies requirements for documentation of noise levels in an airplane flight manual or rotorcraft flight manual. The FAA is proposing to add the word “Documentation” as the first word of the subpart title to more specifically identify the subject matter of subpart O.

Proposed section 36.1581(a)(2) would be amended by changing the reference from appendix F to appendix G. The noise certification requirement for propeller-driven small airplanes

were moved to appendix G in Amendment 36-16 (53 FR 47394, November 22, 1988), and this reference was overlooked.

A new proposed section 36.1581(a)(3) would be added to require that helicopter noise levels be included in the rotorcraft flight manual. This change specifies the noise certification documentation requirements; these would be similar to requirements for other types of aircraft. This would provide uniform noise level documentation requirements for each aircraft category and would standardize documentation procedures. This amendment is intended to improve certification tracking and documentation referencing.

### Section H36.3 Reference Test Conditions

Proposed section H36.3(a)(1) would add sea level pressure in metric units in addition to English units already specified. This would prevent possible variations in measured data that could result from differing conversion factors by applicants using metric units.

Proposed section H36.3(c)(2) would remove a redundant designation regarding FAA approval. No substantive change in the approval process is intended.

Proposed section H36.3(d) would delete the reference to rotor speed because it is an unnecessary parameter in describing a flight profile. This reference was included in error.

Proposed section H36.3(d) would add two new criteria for reference airspeeds:  $0.9V_{NE}$  and  $0.45V_{NE}+65$  knots. Currently, the reference airspeeds specified are limited to either  $0.9V_H$  or  $0.45V_H+65$  knots, whichever is less. [Note:  $V_{NE}$  is the never-exceed airspeed, an airworthiness limitation, imposed by the manufacturer and approved by the FAA.] The advent of more powerful engines and improved gearboxes have resulted in helicopters that can have a  $V_H$  airspeed in excess

of the power-on  $V_{NE}$  airspeed. Therefore, new noise certification airspeed criteria are necessary to be consistent with technological advances and still accommodate the airworthiness limitations imposed for safety. These two new reference airspeed criteria would serve to satisfy these advances.

Section H36.3(d) would be amended as follows:

1. Specifically, change the symbol “D” to be replaced by “Dr” and the symbol “J” to be replaced by “Jr”.

1. Deleting the reference to rotor speed; it is unnecessary for definition of flight profile.
2. Adding the word “reference” prior to the words “airspeed” and “rotor speed” to indicate that the specifications are for reference flight conditions.

Proposed section H36.3(f)(1)(i) would be amended by changing the approach profile reference from “EK” to “ErKr”, and changing the angle measure “ $6^\circ \pm 0.5^\circ$ ” to “ $6^\circ$ ,” respectively. For a reference situation, no such tolerances are necessary.

Proposed section H36.3(f)(1)(ii) would add test approach angle tolerance limits between  $5.5^\circ$  and  $6.5^\circ$  that were removed from section H36.3(f)(1)(i). This is the appropriate paragraph for these tolerances.

#### Section H36.5 Symbols and units.

Proposed section H36.5 would remove the symbols S,  $S_r$ , T, and  $T_r$  and their descriptions in the Flight Profile Identification-Positions table and remove the symbols  $AS_r$ , AT, and  $AT_r$  and their meanings in the Flight Profile Distances table. The typographical errors; Alr and Anr would

be corrected to  $AL_r$  and  $AN_r$ . In addition, the three new symbols and their descriptions would be added to the Flight Profile Identification-Positions table of this section as follows:

$F_r$ .....Position on reference takeoff path directly above noise measuring Station A.

$G_r$ .....Position on reference flyover path directly above noise measuring Station A.

$H_r$ .....Position on reference approach path directly above noise measuring Station A.

These changes and corrections will make these tables consistent with amended Figures H1 and H3 (reference section H36.205 for proposed changes).

#### Section H36.101 Noise Certification Test and Measurement Conditions

Proposed section H36.101(b)(6)(iii) would remove the paragraph for additional flight test data to determine the variation of EPNL with weight for the takeoff condition. In takeoff, noise generation is a function of torque (power) to the rotor systems, not weight, making the current requirement unnecessary.

Proposed section H36.101(b)(8)(ii) would require approach tests to be conducted between 90 percent and 105 percent of the rotorcraft's maximum certification weight. This change is needed to make this section consistent with section H36.101(b)(6)(ii), and simplifies the rules for the three conditions. (See §§H36.101(b)(6)(ii) for takeoff and flyover).

Proposed section H36.101(b)(8)(iii) removes the paragraph for additional flight test data that is used to determine the variation of EPNL with weight for the approach condition. In approach, noise generation is predominantly a function of complex aeroacoustic sources associated with main rotor blade vortex interaction, not weight, making the current requirement unnecessary. This would further harmonize measurement procedures and streamline certification testing.

Proposed section H36.101(b)(6) requires at least one flight at, or above, the noise certification weight for each of the three flight procedures. The proposal also removes the requirement for correction of off-reference weight for the takeoff and approach procedures. This paragraph is also being removed from section H36.205.

Proposed section H36.101(c)(2) would change the minimum test temperature from 36°F (2.2°C) to 14°F (-10°C). The current 36°F (2.2°C) temperature limit is unnecessarily restrictive, given that no higher levels of atmospheric absorption could be encountered by lowering the test day temperature. Although there is a revised minimum test air temperature limit, the limit for the noise measuring equipment is unchanged.

Proposed section 36.101(c)(2) would also specify that the temperature test window be based on the 10-meter temperature values and that the 10-meter temperature and relative humidity values be used to adjust the sound propagation path for propagation path absorption. Noise certification data collected to date has demonstrated that EPNL values corrected using atmospheric data measured at 10 meters are acoustically identical to those corrected using averaged temperature and relative humidity data. The proposed changes would replace historically unreliable temperature data collection.

Proposed section H36.101(c)(3) would specify allowing the use of only the relative humidity and ambient temperature values of the 10-meter measurement station for allowable sound attenuation in the one-third octave band centered at 8 kHz and no longer require the use of aircraft relative humidity and ambient temperature measurements. This change is supported by years of noise certification data demonstrating that atmospheric measurements at 10-meters satisfies both the sound attenuation and relative humidity range requirements. Helicopter noise certification test

experience has shown that relative humidity measurements at the helicopter position is difficult and subject to error given the available instrumentation and procedures. Analysis has indicated minimal differences between humidity measured at the helicopter position and the 10-meter measurement position. Corrections have been no greater than 0.1 dB except under extreme conditions that otherwise would be considered an anomalous meteorological condition.

Proposed section H36.101(c)(5) would specify that tests not be conducted under anomalous wind or anomalous meteorological conditions. If these conditions exist at test sites in a desert environment, temperature and relative humidity must be established using FAA-approved procedures.

Proposed section H36.101(d) would specify that the helicopter height and lateral position is determined relative to the reference flight track, not the centerline or runway. The differential global positioning system is acceptable as an independent method of determining the position of the helicopter.

#### Section H36.103 Takeoff Test Conditions

Proposed section H36.103(b)(1) would specify that the takeoff procedure airspeed be established prior to entering the 10dB-down time interval of the climbout as opposed to the current requirement that the takeoff procedure airspeed must be established during the horizontal portion of the takeoff test procedure. This change more clearly specifies that the portion of the takeoff at which the required airspeed must be maintained; this procedure allows the pilot to establish and stabilize required power settings at the time the climb is started. This proposal would simplify the pilot workload by requiring one less parameter (power) that must be stabilized at the time the climb

is stated. This method is only satisfactory if the initial 10 dB-down time interval occurs during the climb portion of the profile.

Proposed section H36.103(b)(3) would more clearly define gearbox torque limit. It also adds the alternate of maximum take-off power. The lower of the two is used for specifying required takeoff condition. This change more closely aligns part 36 with JAR 36 without any substantive change. This section will no longer contain paragraphs (i) and (ii); the material is included in the text of (b)(3) as described.

Proposed section H36.103(b)(4) would clarify that portion of the takeoff at which the required best rate of climb airspeed, or the lowest airworthiness approved takeoff speed must be maintained. This section will no longer contain paragraphs (i) and (ii); the material is included in the text of (b)(3) as described. This change more closely aligns part 36 with JAR 36 without any substantive change.

Proposed section H36.103(b)(5) would define the highest rotor speed used in takeoff. It also states that the rotor's average rpm, rather than instantaneous rpm is required to be within  $\pm 1.0$  percent during the 10 dB-down time interval.

Proposed section H36.103(b)(6) would add a new alternate allowable altitude criteria of a wider zenith tolerance in meters for low altitudes near the start point. The criteria retains the current permitted zenith tolerance defined in degrees throughout the 10 dB-down time interval. This change more closely aligns part 36 with JAR 36 without any substantive change.

Proposed section H36.103 (b)(7) would add a new paragraph that requires that a constant takeoff configuration be maintained, and that the landing gear may be retracted when establishing the best rate-of-climb and corresponding speed as required by the U. S. airworthiness standards.



### Section H36.105 Flyover Test Conditions

Proposed section H36.105(b) would specify in detail that an even number of flights (6 or more) is required to assure balanced measurement of any directional effects that may be related to flight path orientation.

Proposed section H36.105(b)(1) would add the term “cruise configuration” in requiring that a constant cruise configuration be maintained. This change adopts a commonly understood term and will minimize misinterpretation of allowance for unsteady, variable speed operations during flyover test conditions.

Proposed section H36.105(c)(1) would add two alternative flyover airspeed criteria to the current requirement of continuous power ( $V_H$ ). The proposed additional level flyover reference airspeeds are 90 percent of the never-exceed airspeed,  $V_{NE}$ , and 45 percent of the never-exceed airspeed plus 65 knots; the least of the three is the required airspeed. As explained above in section H36.3(d), the advent of more powerful engines and improved gearboxes have resulted in helicopters that can have a  $V_H$  airspeed in excess of the power-on  $V_{NE}$  airspeed. Therefore, new noise certification airspeed criteria are necessary to be consistent with technological advances but still accommodate the airworthiness limitations imposed for safety. These two new reference airspeed criteria would serve to satisfy these advances. This change more closely aligns part 36 with JAR 36 without any substantive change.

Proposed section H36.105(c)(2) would define the highest rotor speed used in flyover. It also states that the rotor’s average rpm, rather than instantaneous rpm, is required to be within  $\pm 1.0$  percent during the 10 dB-down time interval.

### Section H36.107 Approach Test Conditions

Proposed section H36.107(b)(3) would add a new alternate allowable altitude criteria of a wider zenith tolerance in meters for low altitudes near the end point of the approach. The criteria retains the current permitted zenith tolerance defined in degrees throughout the 10 dB-down time interval. This change more closely aligns part 36 with JAR 36 without any substantive change.

Proposed section H36.107(b)(5) defines the highest rotor speed to be used in approach. It also states that the rotor's average rpm, rather than instantaneous rpm, is required to be within  $\pm 1.0$  percent during the 10 dB-down time interval. Thus, each noise certification condition will be tested at the highest operating rotor RPM as specified in the Flight Manual. These amendments are intended to more closely replicate actual operating rotor speed when conducting noise certification tests.

Proposed section H36.107(b)(6) would add a new paragraph that requires that a constant takeoff configuration be maintained, and that the landing gear may be retracted when establishing the best rate-of-climb and corresponding speed as required by the airworthiness standards.

### Section H36.109 Measurement of Helicopter Noise Received on the Ground

Under this proposal, section H36.109 would be revised to reference section B36.3. Note: The jet noise harmonization proposed rule (65 FR 42796, July 11, 2000) includes a proposal for amending the values in section B36.3. The proposed change would also apply to helicopter noise and tests.

### Section H36.111 Reporting and Correcting Measured Data

Proposed section H36.111(c)(2) would add a permissible EPNL correction for takeoff flight condition only. The amount of this allowable correction is limited. Corrections for duration are described in sections H36.205(f)(1) and H36.205(g)(1)(i). This change will reduce the number of takeoff flights during testing.

Paragraphs (c)(2)(i) through (iv) are being re-designated. Paragraph (c)(2)(i) contains a minor editorial correction. Paragraph (c)(2)(ii) is revised to include only the difference between actual and reference flight paths. This change eliminates specific application that have become obsolete by recent technology. The text of current paragraph (c)(2)(iii) is deleted; it is no longer needed if the previous changes are made. The text of current paragraph (c)(2)(iv) is re-designated (c)(2)(iii) and is revised by retaining only the reference to H36.205.

Proposed section H36.111(c)(3) changes the aircraft noise level threshold that must exceed the background level in each 1/3 octave band from 5dB to 3dB. This change would bring appendix H in line with appendix B for transport category and turbojet powered airplanes.

### Section H36.113 Atmospheric Attenuation of Sound

Proposed section H36.113(b) would amend the current external reference to the revised section B36.7 proposed in the NPRM for subsonic jet, large airplanes and subsonic transports. Section B36.7 describes the method to calculate atmospheric attenuation rates and completely documents them within the regulation under part 36. Documenting this section within U. S. regulations follows a similar ICAO practice and builds the harmonization between regulations.

Proposed section H36.113(c)(1)(iii) is revised to specify that the 10-meter temperature and relative humidity measurement values be used to adjust for the sound propagation path absorption. Noise certification data collected to date has demonstrated that EPNL values corrected using atmospheric data measured at 10 meters are acoustically identical to those corrected using averaged temperature and relative humidity data. There is no loss in accuracy by avoiding inherent aircraft measurement inaccuracies.

#### Section H36.205 Detailed Data Correction Procedures

Proposed section H36.205(a)(1) is revised to allow negative value corrections. Such corrections are appropriate to accurately account for any difference between reference and test conditions. Currently, negative corrections resulted in no correction (essentially setting the value to zero). This change will consider all influences, whether negative or positive.

Proposed sections H36.205(a)(1)(i) and H36.205(a) (ii) are revised to specify corrections based on “differences” from reference rather than conditions “greater than” or “higher than” reference. This change clarifies the requirement.

Proposed section H36.205(a)(1)(iii) eliminates the correction to the EPNL calculated from measured data if the test weight is less than maximum certification weight. Based on past test data, such weight effects are difficult to isolate from other dominant parameters. Such corrections are unnecessary.

Under this proposal, section H36.205(a)(2) is deleted. This material is no longer necessary given the allowance of negative correction values described in section H36.205(a)(1).

Proposed section H36.205(a)(3)(iii) redefines in more accurate descriptive terms the distances applied for duration corrections. Instead of “minimum” distances, the existing rule requires that distances be based on the PNLT (maximum PNLT) distance. This is a more accurate method for correcting for noise impact since it is based on the actual noise characteristics (peak PNLT) rather than a minimum distance along the flight path.

Proposed section H36.205(a)(3)(iv) would replace the use of rotor rpm and test speed with the acoustically accurate term of Mach number that accounts for both rpm and test speed effects. This is a more concise and accurate variable to apply when addressing the acoustical effects of cumulative speed.

Proposed section H36.205(b)(ii)(2) simplifies the takeoff airspeed range by designating as the minimal boundary the slowest climb speed allowed under the airworthiness requirements. The proposed language also removes the reference to rotor speed, since rotor speed is not needed in describing a flight profile for data correction purposes. This reference was included in error.

Proposed section H36.205(b)(3) removes the minimal distance description from the paragraph. This description is no longer needed given the proposed change to section H36.205(a)(3)(iii).

Proposed section H36.205(c)(1) removes text that describes speed criteria. It is not appropriate in a section describing data correction because the criteria are included elsewhere in part 36. The proposed language also removes a reference to rotor speed, since rotor speed is not needed in describing a flight profile for data correction purposes.

Proposed section H36.205(d)(2) would eliminate the requirement that the test approach procedure be included in the Flight Manual. Such a procedure is never used in approach , and if

included in the Flight Manual, could be confused with approved airworthiness approach procedures. The proposal also explains the term “10 dB down period” with “10 dB-down time interval” as the accepted nomenclature for this specific time segment. This “harmonized” term is being adopted in the regulations for jets, large turboprop, small airplanes, and helicopters.

Proposed section H36.205(d)(3) removes the minimal distance description from the reference to figure H3. This description is no longer needed given the proposed change to section H36.205(a)(3)(iii).

Proposed section H36.205(e)(1) removes the requirement that only the advancing blade tip Mach number be used when making source noise adjustments. It also adds an alternate procedure for off-reference tip Mach number adjustments. The proposal allows use of a more appropriate source noise adjustment parameter which would give results identical to that of the more complex current procedure while substantially reducing the amount of additional flyover passes necessary to generate statistically valid source noise sensitivity curves.

Proposed section H36.205(f)(1)(i) corrects designations of measured takeoff sound propagation path and length, “ $L_rA$ ” to “AL” and “ $L_rA$ ” to “ALr” , respectively.

Proposed section H36.205(f)(2) replaces incorrect designations of takeoff distances for measured and reference paths, “AM” to “AN” and AMr” to “ANr” , respectively, and add “i” to the alpha in the second term.

Proposed section H36.205(f)(3) removes the “o” and “+” symbol from the equation; they are incorrect.

Proposed corrections for the designator “K” by flight condition are as follows: “Ln” to “Lr”, “M” to “N”, “Mn” to “Nr”, and “N” to “M”, “Nr” to “Mr”, respectively, within the paragraph text. This change also corrects a typographical error.

Proposed section H36.205(f)(4) replaces incorrect designations of flyover distances for measured and reference paths, “AN” to “AM” and ANr” to “AMr” , respectively, and adds a subscript “i” to the first alpha in the second term.

Proposed sections H36.205(g)(1)(i), through (iv) correct the constant value “-10” to “-7.5” in front of the log term in each of the  $\Delta_2$  equations.

Proposed section H36.205(g)(1)(i) corrects the term for measured and reference lengths, “AT” to “AL” and “ATr” to “ALr”, respectively within the  $\Delta_2$  equation and paragraph text.

Proposed section H36.205(g)(1)(ii) corrects the terms used for measured and reference lengths, “AS” to “AN” and “ASr” to “ANr”, respectively, within the  $\Delta_2$  equation and paragraph text.

Proposed section H36.205(g)(1)(iii) corrects the terms used for measured and reference lengths at each of the flight condition, “T” to “L” , “Tr” to “Lr” , “S” to “N” , “Sr” to “Nr” , and “G” to “M” , “Gr” to “Mr” , respectively, within the paragraph text.

Proposed section H36.205(g)(1)(iv) corrects the terms used for measured and reference lengths, “AG” to “AM” and “AGr” to “AMr” , respectively within the  $\Delta_2$  equation and paragraph text. All of the corrections in section H36.205(g)(1) are of previous errors. No substantive changes are intended.

### Figures H1, H2 and H3

Proposed revision to Figure H1 deletes the designation of Positions Tr since the minimal distance designation is no longer needed and includes the height above measurement point in metric units; see the text of proposed section H36.205(b)(3) regarding the takeoff condition.

Proposed revision to Figure H2 repositions the bullet-marker that's incorrectly positioned near label G due to a typographical error. The marker is repositioned in the proposed revised graphic image at the intersection of line Dr-Jr and line A-G.

Proposed revision to Figure H3 deletes the designations of Positions S and Sr since the minimal distance designation is no longer needed and includes the height above measurement point in metric units; see the text of section H36.205(d)(3) regarding the approach condition.

In proposed Figures H1, H2, and H3 the titles of the figures are changed to reflect the language of this proposal. The word "reference" would replace the word "corrected" in each title.

#### Section H36.305 Noise levels

Proposed sections H36.305(a)(2)(i) through (iii) would revise the values for the noise/weight reduction rate, from "3.01" to "3.0". The proposed text also removes the phrase "for maximum weight of 1,764 pounds or less" from the end of each paragraph and replaces it with the phrase "after which the limit is constant." The existing text was found to be confusing; this proposed change would enhance clarity. No substantive change in the requirements is intended.

#### Section J36.1 General

Proposed section J36.1 would increase the maximum takeoff weight requirement of appendix J from 6,000 pounds to 7,000 pounds. As explained previously, Part 27 was amended to



increase the allowable passenger seat limit to nine; accordingly the weight limit was increased to 7,000 lbs. This proposal makes the corresponding changes in appendix J.

#### Section J36.3 Reference test conditions.

Proposed section J36.3(c) would clarify that the stabilized airspeed be maintained throughout the measured portion of the flyover. Stabilized airspeed will insure the highest quality noise data by avoiding variability of advancing tip Mach number that effectively impacts noise.

Proposed section J36.3(c)(1) would add the requirement airspeed  $V_{NE}$  that must be included in the approved Flight Manual. These changes standardize the languages used in appendices H and J without substantive change.

#### Section J36.101 Noise Certification and Measurement Conditions

Proposed section J36.101(c)(4) revises the location where meteorological data is measured. This change would harmonize this proposal with the JAR and adds flexibility without substantive change. It also makes the language of this section compatible with J36.101(c)(6).

Proposed section J36.101(c)(6):

1. Specifies that the physical location of meteorological instruments be representative of the atmospheric conditions existing near the surface over the geographical area where the helicopter noise measurements are made.
2. Provides that a fixed meteorological station, such as those found at airports, may be used to meet the location requirement.

3. Adds the requirement that a fixed meteorological station must be within 2,000 meters of the noise measurement area. The 2,000-meter distance limitation is a reasonable allowance when using a “fixed meteorological station.”

These proposed changes harmonize this proposal with the JAR and add flexibility without substantive change since part 36 requirements specify that the meteorological measurements be made “at the noise monitoring station,” while JAR requirements specify that if the measurement site is within 2,000 meters of an aerodrome thermometer, the aerodrome reported temperature be used.

#### Section J36.109 Measurement of Helicopter Noise Received on the Ground

Under this proposal, three references to section H36.109 are being changed to section B36.3. Section H36.109 was removed because the data appears in section B36.3. Note: The jet noise harmonization proposed rule (65 FR 42796, July 11, 2000) includes a proposal for amending the values in section B36.3. The proposed change would also apply to helicopter noise and tests but the proposal is not repeated in this NPRM to avoid confusion.

Proposed section J36.305(a) would have the same correction as made in section H36.305(a) above.

Proposed section J36.305(a) increases the upper weight limit from 6,000 pounds to 7,000 pounds maximum gross weight. This is a conforming change for reasons already described.

#### **Paperwork Reduction Act**

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. We have determined that there are no new information collection requirements associated with this proposed rule.

### **International Compatibility**

In keeping with the U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified the following two differences with these proposed regulations. These two differences are applicability provisions that already exist and do not represent substantive changes. If this proposal is adopted, the FAA will file these differences with ICAO.

(1) Sections 36.11 and H36.305 of part 36 allow for higher than Stage 2 noise limits for helicopter changes in the type design of certain (Stage 1) helicopters certified before the “grandfather” clause date of March 6, 1986; and

(2) Section 36.805(c) allows for higher than Stage 2 noise limits for helicopter changes in the type design of certain (Stage 1) helicopters that the FAA recognizes as the first civil version that was designed, constructed for and accepted for operational use by an Armed Force of the United States.

## **Economic Evaluation**

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency propose or adopt a regulation only upon a determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (19 U.S.C. section 2531-2533) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act also requires agencies to consider international standards and, where appropriate, use them as the basis of U.S. standards. And fourth, the Unfunded Mandates Reform Act of 1995 requires agencies to prepare a written assessment of the costs, benefits and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local or tribal governments, in the aggregate, or by the private sector, of \$100 million or more annually (adjusted for inflation.)

In conducting these analyses, FAA has determined this rule 1) has benefits which do justify its costs, is not a “significant regulatory action” as defined in the Executive Order and is not “significant” as defined in DOT's Regulatory Policies and Procedures; 2) will not have a significant impact on a substantial number of small entities; 3) reduces barriers to international trade; and 4) does not impose an unfunded mandate on state, local, or tribal governments, or on the private sector. These analyses, available in the docket, are summarized below.

This notice of proposed rulemaking would provide nearly uniform noise certification standards for helicopters certificated in the United States, the JAA countries, and any other

countries that have adopted as their national regulation either the United States regulation, the JAA regulation, or the ICAO standard.

The proposals would more closely harmonize the flight test conditions, procedures, and reporting requirements mandated by the provisions of Subpart A and appendices H, and J of 14 CFR part 36 with the corresponding applicable provisions of the Joint Aviation Regulations (JAR) 36 and the International Civil Aviation Organization (ICAO) Annex 16. Specifically, the proposal would amend some of the technical specifications of appendices H and J and add a new definition to Subpart A of part 36.

The FAA concludes that the proposed rule would be cost beneficial. The proposed rule would require fewer flyover passes, takeoffs, and microphone systems, would eliminate humidity and wind speed measurements and the requirements to process test data twice and issue separate reports for FAA and ICAO methods, and would extend the gross weight upper limit for the appendix J certification test procedure. The cost savings of the proposed rule are estimated to be \$17.31 million (\$12.16 million, discounted) over a 10 year period. The one-time cost of this proposed rule would be \$40,800 (\$33,305 discounted) and would accrue to those manufacturers that need to obtain ICAO/JAA certification.

### **Initial Regulatory Flexibility Determination**

The Regulatory Flexibility Act of 1980 (RFA) establishes “as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business,

organizations, and governmental jurisdictions subject to regulation.” To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 act provides that the head of the agency may so certify and an regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

Small entities are firms employing 1,500 employees or less based on Small Business Administration guidelines. Enactment of this proposal would impose a one-time cost of \$10,200 per small entity, which would be incurred by two small helicopter manufacturers that met the criterion of small entity. The yearly cost-savings per small entity would be \$265,000. In view of the substantial net cost-savings per small entity, the FAA has determined that this proposed rule would not have a significant adverse economic impact on a substantial number of small entities; therefore, a regulatory flexibility analysis is not required under the terms of the RFA. The FAA solicits comments with respect to this finding and determination and requests that all comments be accompanied by clear documentation.

## **International Trade Impact Assessment**

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be used as the basis for U.S. standards. In addition, consistent with this Administration's belief in the general superiority and desirability of free trade, it is the policy of this Administration to remove or diminish to the extent feasible, barriers to international trade, including both barriers affecting the export of American goods and services to foreign countries and barriers affecting the import of foreign goods and services into the United States.

This proposed rule is a direct action to respond to this policy by increasing the harmonization of the U.S. Federal regulations with the European Joint Aviation Requirements. The results would facilitate international trade.

## **Unfunded Mandated Assessment**

The Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, is intended, among other things, to curb the practice of imposing unfunded Federal mandates on State, local, and tribal governments. Title II of the Act requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in a \$100 million or more expenditure (adjusted annually for inflation) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a "significant regulatory action."

This proposed rule does not contain such a mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

### **Executive Order 13132, Federalism**

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. The FAA has determined that this action would not have substantial direct effects on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, the FAA has determined that this notice of proposed rulemaking would not have federalism implications.

### **Environmental Assessment**

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental assessment (EA) or environmental impact statement (EIS). In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), regulations, standards, and exemptions (excluding those, which if implemented may cause a significant impact on the human environment) qualify for a categorical exclusion. The FAA has determined that this rule qualifies for a categorical exclusion because no significant impacts to the environment are expected to result from its finalization or implementation.

### **Energy Impact**



The energy impact of the notice has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) Pub. L. 94-163, as amended (42 U.S.C. 6362) and FAA Order 1053.1. It has been determined that the notice is not a major regulatory action under the provisions of the EPCA.

### **List of Subjects in 14 CFR Part 36**

Aircraft, Noise Control.

### **The Proposed Amendment**

In consideration of the foregoing the Federal Aviation Administration proposes to amend 14 CFR part 36, as follows:

## **PART 36 - NOISE STANDARDS: AIRCRAFT TYPE AND AIRWORTHINESS CERTIFICATION**

1. The authority citation for part 36 continues to read as follows:

**Authority:** 42 U.S.C. 4321 et seq.; 49 U.S.C. 106(g), 40113, 44701-44702, 44704, 44715; sec. 305, Pub. L. 96-193, 94 Stat. 50, 57; E.O. 11514, 35 FR 4247, 3 CFR, 1966-1970 Comp., p. 902.

2. Section 36.1 is amended by adding a new paragraph (h)(5) to read as follows:

### **§ 36.1 Applicability and definitions.**

\* \* \* \* \*

(h) \* \* \*

(5) Maximum normal operating RPM means the highest rotor speed for each

reference procedure corresponding to the airworthiness limit imposed by the manufacturer and approved by the FAA. Where a tolerance on the highest rotor speed is specified, the maximum normal operating rotor speed is the highest rotor speed for which that tolerance is given. If the rotor speed is automatically linked with flight condition, the maximum normal operating rotor speed corresponding with that flight condition must be used during the noise certification procedure. If rotor speed can be changed by pilot action, the highest normal operating rotor speed specified in the flight manual limitation section for power-on conditions must be used during the noise certification procedure.

3. Section 36.11 is amended by revising the introductory text, and be removing “6000” and adding “7000” in paragraph (a)(1).

**§ 36.11 Acoustical change: Helicopters.**

This section applies to all helicopters in the primary, normal, transport, and restricted categories for which an acoustical change approval is applied for under § 21.93(b) of this chapter on or after March 6, 1986. Compliance with the requirements of this section must be demonstrated under appendix H of this part, or, for helicopters having a maximum certificated takeoff weight of not more than 7,000 pounds, compliance with this section may be demonstrated under appendix J of this part.

4. Section 36.801 is revised by removing the term “6,000” in the second sentence and adding the term “7,000” in its place.

**Subpart O-Documentation, Operating Limitations and Information**

5. Revise the heading of Subpart O to read as set forth above:

6. In section 36.1581 paragraph (a)(2) is revised and paragraph (a)(3) is added to read as follows:

**§ 36.1581 Manuals, markings, and placards**

\* \* \* \* \*

(2) For propeller driven small airplanes the noise level information must be one value for takeoff as defined and required by appendix G of this part, along with the maximum takeoff weight and configuration.

(3) For rotorcraft the noise level information must be one value for each takeoff, flyover, and approach as defined and required by appendix H of this part or one value for flyover as defined and required by appendix J of this part along with the maximum takeoff weight, maximum landing weight (for appendix H), and configuration.

\* \* \* \* \*

7. In Appendix H, § H36.3 is amended by revising paragraphs (a)(1), (c)(2), (d), (e), (f)(1)(i), and (f)(1)(ii) to read as follows:

**Section H36.3 Reference test conditions.**

(a) \* \* \*

(1) Sea level pressure of 2,116 psf (76 cm mercury, 1,013.25 hPa).

(c) \* \* \*

(2) The reference flight path is defined as a straight line segment inclined from the starting point (1,640 feet prior to the center microphone location at 65 feet above ground level) at an constant climb angle  $\beta$  defined by the certificated best rate of climb and  $V_y$  for minimum

engine performance. The constant climb angle  $\beta$  is derived from the manufacturer's data (approved by the FAA) to define the flight profile for the reference conditions. The constant climb angle  $\beta$  is drawn through  $C_r$  and continues, crossing over station A, to the position corresponding to the end of the type certification takeoff path represented by position  $I_r$ .

(d) Level flyover reference profile. The beginning of the level flyover reference profile is represented by helicopter position  $D_r$  (Figure H2). The helicopter approaches position  $D_r$  in level flight 492 feet above ground level as measured at Station A. Reference airspeed must be either  $0.9V_H$ ;  $0.9V_{NE}$ ;  $0.45V_H + 65$  kts ( $0.45V_H + 120$  km/h); or  $0.45V_{NE} + 65$  kts ( $0.45V_{NE} + 120$  km/h), whichever of the four speeds is least. The helicopter crosses directly overhead station A in level flight and proceeds to position  $J_r$ .

(e) For noise certification purposes,  $V_H$  is defined as the airspeed in level flight obtained using the minimum specification engine torque corresponding to maximum continuous power available for sea level, 25° C ambient conditions at the relevant maximum certificated weight.  $V_{NE}$  is the never-exceed airspeed. The value of  $V_H$  and  $V_{NE}$  used for noise certification must be included in the approved Flight Manual.

(f) \* \* \*

(1) \* \* \*

(i) The beginning of the approach profile is represented by helicopter position E. The position of the helicopter is recorded for a sufficient distance (EK) to ensure recording of the entire interval during which the measured helicopter noise level is within 10 dB of Maximum Tone Corrected Perceived Noise Level (PNLTM), as required.  $ErKr$  represents a stable flight

condition in terms of torque, rpm, indicated airspeed, and rate of descent resulting in a  $6^\circ$  approach angle.

(ii) The test approach profile is defined by the approach angle  $\eta$  passing directly over the station A at a height of AH, to position K, which terminates the approach noise certification profile. The test approach angle  $\eta$  must be between  $5.5^\circ$  and  $6.5^\circ$ .

\* \* \* \* \*

8. In Appendix H, section H36.5, the Flight Profile Identification-Positions table is amended by removing the symbols S, S<sub>r</sub>, T and T<sub>r</sub> and their descriptions; the Flight Profile Distances table is amended by removing the symbols AS<sub>r</sub>, AT, and AT<sub>r</sub> and their meanings. The Flight Profile Identification-Positions table is revised by adding three new symbols and their descriptions in alphabetical order to read as follows:

Section H36.5 Symbols and units.

F<sub>r</sub>..... Position on reference takeoff path directly above noise measuring  
Station A.

G<sub>r</sub>..... Position on reference flyover path directly above noise measuring  
Station A.

H<sub>r</sub>..... Position on reference approach path directly above noise measuring  
Station A.

9. In Appendix H, section H36.101 is revised by removing paragraphs (b)(6)(iii) and (b)(8)(iii); by redesignating paragraph (b)(9) as (d)(4); and by revising paragraphs (b)(8)(ii), (c)(2), (c)(3), (c)(5), (d)(2), (d)(3) and newly redesignated paragraph (d)(4) to read as follows:

Section H36.101 Noise certification test and measurement conditions.

\* \* \* \* \*

(b) \* \* \*

(8) \* \* \*

(ii) Each test weight must be within +5 percent and -10 percent of the maximum certification weight.

(c) \* \* \*

(2) Ambient air temperature between 14°F and 95°F (-10°C and 35°C), inclusively, at a point 10 meters above the ground at the noise measuring station. The temperature and relative humidity measured at a point 10 meters above the ground at the noise measuring station must be used to adjust for propagation path absorption.

(3) Relative humidity and ambient temperature at a point 10 meters above the ground at the noise measuring station is such that the sound attenuation in the one-third octave band centered at 8 kHz is not greater than 12 dB/100 meters and the relative humidity is between 20 percent and 95 percent, inclusively.

\* \* \*

(5) No anomalous meteorological conditions (including turbulence) that will significantly affect the noise level of the aircraft when the noise is recorded at each noise measuring station.

\* \* \* \* \*

(d) \* \* \*

(2) The helicopter height and lateral position relative to the reference flight track (which passes through the flight track noise measuring station) must be determined using an FAA-approved method. The equipment used to make the determination must be independent of normal flight instrumentation, such as radar tracking, theodolite triangulation, laser trajectography, photo scaling, or differential global positioning system.

(3) The helicopter position along the flight path must be related to the noise recorded at the noise measuring stations by means of synchronizing signals at an approved sampling rate. The position of the helicopter must be recorded relative to the reference flight track during the entire time interval in which the recorded signal is within 10 dB of PNLTM. Measuring and sampling equipment must be approved by the FAA.

(4) Aircraft performance data sufficient to make the corrections required under section H36.205 of this appendix must be recorded at an FAA-approved sampling rate using FAA approved equipment.

10. In Appendix H, section H36.103 is amended by revising paragraphs (b)(1), (b)(3), (b)(4), (b)(5), and (b)(6), and by adding new paragraph (b)(7) to read as follows:

Section H36.103 Takeoff test conditions.

\* \* \* \* \*

(b) \* \* \*

(1) An airspeed of either  $V_y \pm 5$  knots or the lowest approved speed  $\pm 5$  knots for the climb after takeoff, whichever speed is greater, must be established and maintained throughout the 10 dB-down time interval.

(2) \* \* \*

(3) Upon reaching a point 1,640 feet (500 meters) from the noise measuring station, the helicopter must be stabilized at the maximum take-off power that corresponds to minimum installed engine(s) specification power available for the reference ambient conditions or gearbox torque limit, whichever is lower.

(4) The helicopter must be maintained throughout the 10 dB-down time interval at the best rate of climb speed  $V_y \pm 5$  knots, or the lowest approved speed for climb after takeoff, whichever is greater, for an ambient temperature at sea level of 25°C.

(5) The average rotor speed must not vary from the maximum normal operating rotor RPM by more than  $\pm 1.0$  percent during the 10 dB-down time interval.

(6) The helicopter must stay within  $\pm 10^\circ$  or  $\pm 20$  m, whichever is greater, from the vertical above the reference track throughout the 10dB-down time interval.

(7) A constant takeoff configuration selected by the applicant must be maintained throughout the takeoff reference procedure with the landing gear position consistent with the airworthiness certification tests for establishing Best Rate-of-Climb and Speed for Best Rate-of-Climb.

11. In Appendix H, section H36.105 is amended by revising paragraphs (b) introductory text, (b)(1), (b)(3), (c)(1), and (c)(2) to read as follows:



Section H36.105 Flyover test conditions.

\* \* \* \* \*

(b) A test series must consist of at least six flights with an equal number of runs in each direction, over the flight-track noise measuring station (with simultaneous measurements at all three noise measuring stations)--

(1) In level flight cruise configuration;

(2) \* \* \*

(3) The helicopter must stay within  $\pm 10^\circ$  or  $\pm 20$  m, whichever is greater, from the vertical above the reference track throughout the 10 dB-down time interval.

(c) \* \* \*

(1) At a speed of  $0.9V_H$ ;  $0.9V_{NE}$ ;  $0.45V_H + 65$  kts ( $0.45V_H + 120$  km/h); or  $0.45V_{NE} + 65$  kts ( $0.45V_{NE} + 120$  km/h), whichever speed is less, maintained throughout the measured portion of the flyover;

(2) At average rotor speed which must not vary from the maximum normal operating rotor RPM by more than  $\pm 1.0$  percent during the 10 dB-down time interval.

\* \* \* \* \*

12. Section H36.107 is amended by revising paragraphs (b)(3) and (b)(5) and adding new paragraph (b)(6) to read as follows:

Section H36.107 Approach test conditions.

\* \* \* \* \*

(b) \* \* \*

(3) The helicopter must stay within  $\pm 10^\circ$  or  $\pm 20$  m, whichever is greater, from the vertical above the reference track throughout the 10 dB-down time interval;

(4) \* \* \*

(5) At average rotor speed which must not vary from the maximum normal operating rotor RPM by more than  $\pm 1.0$  percent during the 10 dB-down time interval; and

(6) A constant approach configuration used in airworthiness certification tests, with the landing gear extended, must be maintained throughout the approach reference procedure.

\* \* \* \* \*

13. In Appendix H, section H36.109 is revised to read as follows:

Section H36.109 Measurement of helicopter noise received on the ground.

The measurement system and the measurement, calibration and general analysis procedures to be used are provided in Appendix A, section A36.3 of this part.

14. In Appendix H, section H36.111 is amended by revising paragraph (c)(2), by removing paragraph (c)(2)(iv) and the undesignated text following (c)(2)(iv), by revising paragraphs (c)(2)(i), (c)(2)(ii) and (c)(2)(iii); and by revising paragraph (c)(3) to read as follows:

Section H36.111 Reporting and correcting measured data.

\* \* \* \* \*

(c) \* \* \*

(2) The measured flight path must be corrected by an amount equal to the difference

between the applicant's predicted flight path for the certification reference conditions and the measured flight path at the test conditions. Necessary corrections relating to aircraft flight path or performance may be derived from FAA-approved data for the difference between measured and reference engine conditions, together with appropriate allowances for sound attenuation with distance. The Effective Perceived Noise Level (EPNL) correction must be less than 2.0 EPNdB except for take-off flight condition, where the correction must not exceed 4.0 EPNdB, of which the arithmetic sum of  $\Delta_1$  (described in section H36.205(f)(1)) and the term  $-7.5 \log (AL/AL_r)$  from  $\Delta_2$  term (described in section H36.205(g)(1)(i)) must not exceed 2.0 EPNdB, for any combination of the following:

- (i) The aircraft is not passing vertically above the measuring station.
- (ii) Any difference between the reference flight track and the actual test flight track.
- (iii) Detailed correction requirements prescribed in section H36.205 of this appendix.

(3) Aircraft sound pressure levels within the 10 dB-down time interval must exceed the mean background sound pressure levels determined under section B36.3.9.11 by at least 3 dB in each one-third octave band or be corrected under an FAA approved method to be included in the computation of the overall noise level of the aircraft. An EPNL may not be computed or reported from data from which more than four one-third octave bands in any spectrum within the 10 dB-down time interval have been excluded under this paragraph.

\* \* \* \* \*

15. In Appendix H, section H36.113 is amended by revising paragraph (b) and (c)(1)(iii) to read as follows:

Section H36.113 Atmospheric attenuation of sound.

\* \* \* \* \*

(b) Attenuation rates. The procedure for determining the atmospheric attenuation rates of sound with distance for each one-third octave bands must be in accordance with Society of Automotive Engineering (SAE) ARP 866A included in section A36.7 .

(c) \* \* \*

(1) \* \* \*

(iii) The temperature and relative humidity measured at 10 meters above the ground must be used to adjust for propagation path absorption.

\* \* \* \* \*

16. In Appendix H, section H36.205 is amended by removing paragraphs (a)(1)(iii), (a)(2), and (a)(3)(v); removing the last two sentences in paragraph (b)(3) and (d)(3); by revising paragraphs (a)(1)(i), (a)(1)(ii), (a)(3)(iii), (a)(3)(iv), (b)(2), (c)(1), (d)(2), (e), (f)(1)(i), (f)(2)(i), (f)(3), (f)(4), and (g)(1)(i)-(iv), and by revising Figures H1, H2, and H3 to read as follows:

Section H36.205 Detailed data correction procedures.

(a) \* \* \*

(1) If a positive or negative value results from any difference between reference and test conditions, an appropriate correction must be made to the EPNL calculated from the measured noise data. Conditions that can result in a different value include:

(i) Atmospheric absorption of sound under test conditions that are different than the reference; or

(ii) Test flight path at an altitude that is different than the reference

(3) \* \* \*

(iii) The distances for which PNLTM is observed from both the test and reference profiles to the noise measuring station must be calculated and used to determine a noise duration correction due to any change in the altitude of aircraft flyover. The duration correction must be added algebraically to the EPNL calculated from the measured noise data.

(iv) For aircraft flyover, from FAA-approved data in the form of curves or tables giving the variation of EPNL with Mach Number, source noise corrections are determined and must be added to the EPNL, to account for noise level changes due to differences between test conditions and reference conditions.

(b) \* \* \*

(2) For the actual takeoff, the helicopter approaches position C in level flight at 65 feet (20 meters) above ground level at the flight track noise measuring station and at either  $V_y \pm 5$  knots or the lowest approved speed for the climb after takeoff, whichever speed is greater.

\* \* \* \* \*

F

(c) Level flyover profiles. (1) The noise type certification level flyover profile is shown in Figure H2. Airspeed must be stabilized within  $\pm 5$  knots of the reference airspeed given in section H36.3(d). If the test requirements are otherwise met, flight direction may be reversed for each subsequent flyover, to obtain three test runs in each direction.

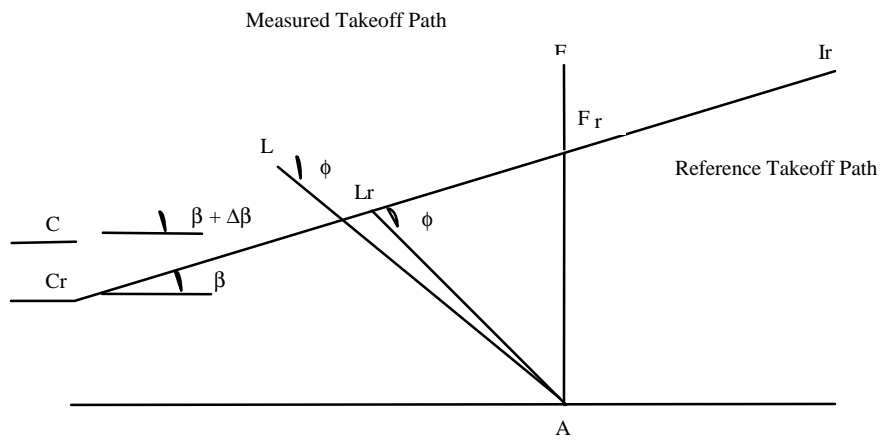


Figure H1. COMPARISON OF MEASURED AND  
REFERENCE TAKEOFF PROFILES

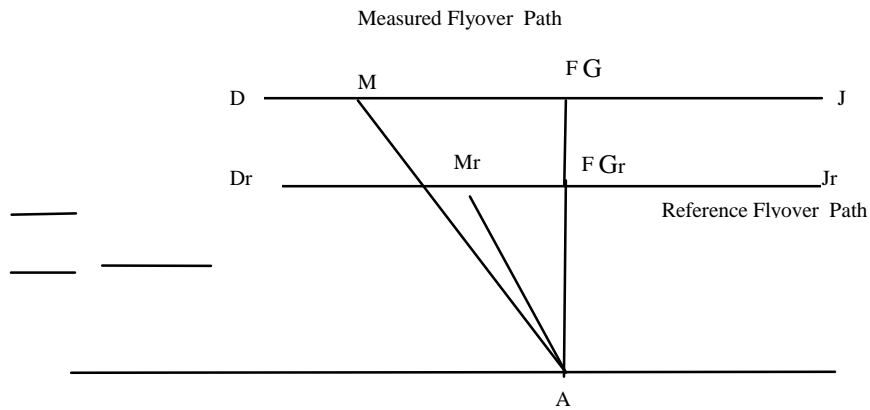


Figure H2. COMPARISON OF MEASURED AND  
REFERENCE FLYOVER PROFILES

\* \* \* \* \*

(d) \* \* \*

(2) The helicopter approaches position H along a  $6^\circ (\pm 0.5^\circ)$  average approach slope throughout the 10dB-down time interval. The approach procedure must be acceptable to the FAA.

\* \* \* \* \*

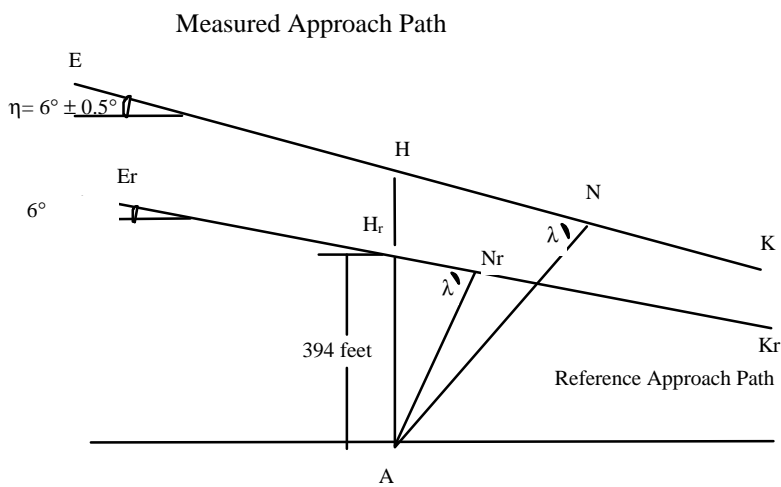


FIGURE H3. COMPARISON OF MEASURED AND  
REFERENCE APPROACH PROFILES

(e) Correction of noise at source during level flyover. (1) For level overflight, if any

combination of the following three factors, airspeed deviations from reference, rotor speed deviations from reference, and temperature deviations from reference, results in a noise correlating parameter whose value deviates from the reference value of this parameter, then source noise adjustments must be determined from the manufacturer's data approved by the FAA.

(f) \* \* \*

(1) \* \* \*

(i) Step 1. A set of corrected values are then computed as follows:

$$SPL_{ic} = SPL_i + (\alpha_i - \alpha_{io})AL + \alpha_{io} (AL - AL_r) + 20 \log (AL/AL_r)$$

where  $SPL_i$  and  $SPL_{ic}$  are the measured and corrected sound pressure levels, respectively, in the  $i$ -th one-third octave band. The first correction term accounts for the effects of change in atmospheric sound absorption where  $\alpha_i$  and  $\alpha_{io}$  are the sound absorption coefficients for the test and reference atmospheric conditions, respectively, for the  $i$ -th one-third octave band, and  $AL$  is the measured takeoff sound propagation path. The second correction term accounts for the effects of atmospheric sound absorption on the change in the sound propagation path length where  $AL_r$  is the corrected takeoff sound propagation path. The third correction term accounts for the effects of the inverse square law on the change in the sound propagation path length.

\* \* \* \* \*

(2) Approach flight path. (i) The procedure described in paragraph (f)(1) of this section for takeoff flight paths is also used for the approach flight path, except that the value for  $SPL_{ic}$  relate to the approach sound propagation paths shown in Figure H3 as follows:

$$SPL_{ic} = SPL_i + (\alpha_i - \alpha_{io}) AN + \alpha_{io} (AN - AN_r) + 20 \log (AN/ AN_r)$$



where the lines AN and ANr are the measured and reference approach sound propagation paths, respectively.

\* \* \* \* \*

(3) Sideline microphones. The procedure prescribed in paragraph (f)(1) of this section for takeoff flight paths is also used for the propagation to the sideline microphones, except that the values of SPL<sub>ic</sub> relate only in the measured sideline sound propagation path as follows:

$$SPL_{ic} = SPL_i + (\alpha_i - \alpha_{io})KX + \alpha_{io} (KX - KX_r) + 20 \log (KX/KX_r)$$

K is the sideline measuring station where

X = L and X<sub>r</sub> = L<sub>r</sub> for takeoff

X = M and X<sub>r</sub> = M<sub>r</sub> for flyover

X = N and X<sub>r</sub> = N<sub>r</sub> for approach

(4) Level flyover flight path. The procedure described in paragraph (f)(1) of this section for takeoff flight paths is also used for the level flyover flight path, except that the values of SPL<sub>ic</sub> relate only to the flyover sound propagation paths as follows:

$$SPL_{ic} = SPL_i + (\alpha_i - \alpha_{io})AM + \alpha_{io} (AM - AM_r) + 20 \log (AM/AM_r)$$

(g) \* \* \*

(1) \* \* \*

(i) Takeoff flight path. For the takeoff flight path shown in Figure H1, the correction term is calculated using the formula --

$$\Delta_2 = - 7.5 \log (AL/AL_r) + 10 \log (V/V_r)$$

which represents the correction that must be added algebraically to the EPNL calculated from the measured data. The lengths AL and ALr are the measured and corrected takeoff distances from the noise measuring station A to the measured and the corrected flight paths, respectively. A negative sign indicates that, for the particular case of a duration correction, the EPNL calculated from the measured data must be reduced if the measured flight path is at greater altitude than the corrected flight path.

(ii) Approach flight path. For the approach flight path shown in Figure H3, the correction term is calculated using the formula --

$$\Delta_2 = -7.5 \log (AN/ANr) + 10 \log (V/Vr)$$

where AN is the measured approach distance from the noise measuring station A to the measured flight path and 394 feet is the overhead distance from station A to the reference flight path.

(iii) Sideline microphones. For the sideline flight path, the correction term is calculated using the formula --

$$\Delta_2 = -7.5 \log (KX/KXr) + 10 \log (V/Vr)$$

K is the sideline measuring station

where X = L and Xr = Lr for takeoff

where X = M and Xr = Mr for flyover

where X = N and Xr = Nr for approach

(iv) Level flyover flight paths. For the level flyover flight path, the correction term is calculated using the formula --

$$\Delta_2 = -7.5 \log (AM/AMr) + 10 \log (V/Vr)$$

where AM is the measured flyover distance from the noise measuring station A to the measured flight path and 492 feet is the overhead distance from station A to the reference flight path.

\* \* \* \* \*

17. In Appendix H, section H36.305(a)(2) is revised to read as follows:

Section H36.305 Noise levels.

(a) \* \* \*

(2) Stage 2 noise limits are as follows:

(i) For takeoff calculated noise levels--109 EPNdB for maximum takeoff weights of 176,370 pounds or more, reduced by 3.0 EPNdB per halving of the weight down to 89 EPNdB, after which the limit is constant.

(ii) For flyover calculated noise levels--108 EPNdB for maximum weights of 176,370 pounds or more, reduced by 3.0 EPNdB per halving of the weight down to 88 EPNdB, after which the limit is constant.

(iii) For approach calculated noise levels--110 EPNdB for maximum weights of 176,370 pounds or more, reduced by 3.0 EPNdB per halving of the weight down to 90 EPNdB, after which the limit is constant.

\* \* \* \* \*

18. Amend the title of Appendix J and section J36.1 introductory text by removing the reference “6000” and adding “7000” in its place

19. In Appendix J, section J36.3 is amended by revising paragraph (c) introductory text and paragraph (c)(1) to read as follows:

Section J36.3 Reference test conditions.

\* \* \* \* \*

(c) Level flyover reference profile. The reference flyover profile is a level flight 492 feet (150 meters) above ground level as measured at the noise measuring station. The reference flyover profile has a linear flight track and passes directly over the noise monitoring station. Airspeed is stabilized at  $0.9V_H$ ;  $0.9V_{NE}$ ;  $0.45V_H + 65$  kts ( $0.45V_H + 120$  km/h); or  $0.45V_{NE} + 65$  kts ( $0.45V_{NE} + 120$  km/h), whichever of the four airspeeds is least, and maintained throughout the measured portion of the flyover. Rotor speed is stabilized at the power on maximum normal operating RPM throughout the 10 dB-down time interval.

(1) For noise certification purposes,  $V_H$  is defined as the airspeed in level flight obtained using the minimum specification engine power corresponding to maximum continuous power available for sea level, 77°F (25°C) ambient conditions at the relevant maximum certificated weight. The value of  $V_H$  and  $V_{NE}$  used for noise certification must be included in the Flight Manual.

\* \* \* \* \*

20. In Appendix J, section J36.101 is amended by revising paragraph (c)(4) and (c)(6) to read as follows:

Section J36.101 Noise certification test and measurement conditions.

\* \* \* \* \*

(c) \* \* \*

(4) Measurements of ambient temperature, relative humidity, wind speed, and wind direction must be made between 4 feet (1.2 meters) and 33 feet (10 meters). Unless otherwise approved by the FAA, ambient temperature and relative humidity must be measured at the same height above the ground.

\* \* \* \* \*

(6) If the measurement site is within 2,000 meters of an airport's weather measurement equipment, the airport reported temperature, relative humidity and wind velocity may be used. A fixed meteorological station (such as those found at airports or other facilities), within 2,000 meters of the noise measuring station, may meet this requirement.

\* \* \* \* \*

21. In Appendix J, section J36.109 is amended by revising paragraphs (d)(1)(ii) and (e)(1) by removing the reference to "section H36.109(c)(3) of appendix H" and adding the reference "section A36.3.6 of appendix B" in its place; and revising paragraph (c)(4) to read as follows:

Section J36.109 Measurement of helicopter noise received on the ground

\* \* \* \* \*

(c)(4) Procedures for calibration and checking of system used must follow those described in Section A36.3.9.

\* \* \* \* \*

22. In Appendix J, section J36.305 is amended by revising paragraph (a) to read as follows:

Section J36.305 Noise Limits.

(a) For primary, normal, transport, and restricted category helicopters having a maximum certificated takeoff weight of not more than 7,000 pounds and noise tested under this appendix, the Stage 2 noise limit is 82 decibels SEL for helicopters up to 1,737 pounds maximum certificated takeoff weight at which the noise certification is requested, and increasing at a rate of 3.0 decibels per doubling of weight thereafter. The limit may be calculated by the equation:  $L_{AE}(\text{limit}) = 82 + 3.0 [\log_{10} (\text{MTOW}/1737)/\log_{10}(2)] \text{ dB}$ , where MTOW is the maximum takeoff weight, in pounds, for which certification under this appendix is requested.

\* \* \* \* \*

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/S/

James D Erickson,  
Director of Environment and Energy.